

Science Olympiad Invitational

Jan 21,2017

Disease Detectives(key)

Total points: 80

Answer all questions.
Tie breaker: Questions 73-80

Match the number of the epidemiology terms 1-11 on the left with the letter(from A-M) of the correct definition from right.

1.Agent	D	A. Animate intermediary that that carries an agent from a reservoir to a susceptible host
2.Carrier	K	B. Disease capable of being transmitted from one person to another by contact or close proximity
3.Fomite	G	C. Disease, chronic condition, or type of injury is constantly present in a given geographic area or population group
4.Distribution	E	D.Factor that is essential for a disease, chronic conditions, or injury to occur
5.Endemic	C	E.Frequency and pattern of health-related characteristics and events in a population
6.Contagious	B	F.Habitat in which an infectious agent normally lives, grows, and multiplies
7.Vector	A	G.Inanimate object capable of carrying infectious agents and transferring them from one person to another
8.Host	L	H.Infectious disease that is transmitted from animals to humans
9.Incidence	M	I.Measure of severity of a disease,expressed as the proportion of people with the disease who become extremely ill or die
10. Reservoir	F	J. Most direct route by which a disease is transmitted
11.Zoonosis	H	K.Person or animal who harbors the infectious agent for a disease and can transmit it to others, but does not show signs of the disease
		L. Person or other living organism that is susceptible to an infectious agent under natural conditions
		M.Rate that measures the frequency with which a health problem, such as a new injury or case of illness, occurs in a population

What is the first step in an outbreak investigation?

12. Prepare to investigate or prepare for field work

The epidemiological triad includes what three elements?

13. Agent

14. Host

15. Environment

Name three components of chain of transmission triad infectious agents

16. Agent

17. vector/Fomite

18. Host

Concisely list the six elements of the Chain of Infection.

19. Infectious Agent

20. Reservoir

21. Portal of Exit

22. Mode of Transmission

23. Portal of entry

24. Susceptible Host

Who is the Father of Modern Epidemiology?

25. John Snow

What are the four components of a case definition?

26. Clinical information

27. Characteristics of people infected

28. Location or place of outbreak

29. Time sequence during which the outbreak occurred

What is required for both a cohort and a case-control study?

30. Control Group

31. Calculate the odds ratio for the following table?

	Positive	Negative	Total
Positive	72	115	187
Negative	5	122	127
Total	77	237	314

A. 15.3

B. 14.4

C. 9.8

D. 18.7

Use the following scenario to answer question 32

Birmingham has a population of 200 people. Before a party, only one person was infected with E.Coli. After the party, another 50 had fallen ill. The E.Coli victim and one other family member were not in attendance at the party, which was later investigated as an outbreak of E.Coli.

32. What was the attack rate for the outbreak?

A. 1/200

B. 51/200

C. 50/200

D. 50/198

33. In a cohort study, the relative risk for drinking apple cider is 4.9. Which interpretation is correct?

A. Apple cider is the cause of the outbreak.

B. People who drank apple cider were almost 5 times more likely to become ill than those who did not.

C. Apple cider is protective.

D. The association between apple cider and illness is statistically significant

34. Which of the following would be reasonable to include in the final report from a foodborne outbreak investigation?

A. Notes from interviews with food workers at implicated establishment

B. Individual laboratory reports

C. Summary of findings from case-control or cohort studies

D. Names of patients

Use the information from the following case to answer questions 35 - 39

A total of 19 people infected with the outbreak strain of Shiga toxin-producing STEC O157:H7 were reported from seven states. The majority of illnesses were reported from the western United States. The number of ill people reported from each state was as follows: California (1), Colorado (4), Missouri (1), Montana (6), Utah (5), Virginia (1), and Washington (1). Among people for whom information was available, illnesses started on dates ranging from October 6, 2015 to November 3, 2015. Ill people ranged in age from 5 years to 84, with a median age of 18. Fifty-seven percent of ill people were female. Five (29%) people were hospitalized, and two people developed hemolytic uremic syndrome, a type of kidney failure. No deaths were reported.

State and local public health officials interviewed ill people to obtain information about foods they might have eaten and other exposures in the week before their illness started. Fourteen (88%) of 16 people purchased or ate rotisserie chicken salad from Costco. Costco helped with public health officials during the investigation by providing records and information related to ingredient suppliers to try to determine the source of the outbreak.

The Montana Public Health Laboratory tested a sample of celery and onion diced blend produced by Taylor Farms Pacific, Inc. and collected from a Costco store in Montana. Preliminary results indicated the presence of *E. coli* O157:H7. This product was used to make the Costco rotisserie chicken salad eaten by ill people in this outbreak. According to the [FDA](#), further laboratory analysis was unable to confirm the presence of *E. coli* O157:H7 in the sample of celery and onion diced blend. Both companies recalled the products voluntarily.

- People usually get sick from Shiga toxin-producing *E. coli* (STEC) 2-8 days (average of 3-4 days) after swallowing the germ.
 - Most people infected with STEC develop diarrhea (often bloody) and abdominal cramps.
 - Most people recover within a week.
 - Some illnesses last longer and can be more severe, resulting in a type of kidney failure called hemolytic uremic syndrome (HUS). HUS can occur in people of any age but is most common in young children under 5 years, older adults, and people with weakened immune systems. Symptoms of HUS can include fever, abdominal pain, pale skin tone, fatigue and irritability, small, unexplained bruises or bleeding from the nose and mouth, and decreased urination.
 - People who experience these symptoms should seek emergency medical care immediately.
- STEC infection is usually diagnosed by testing a stool sample

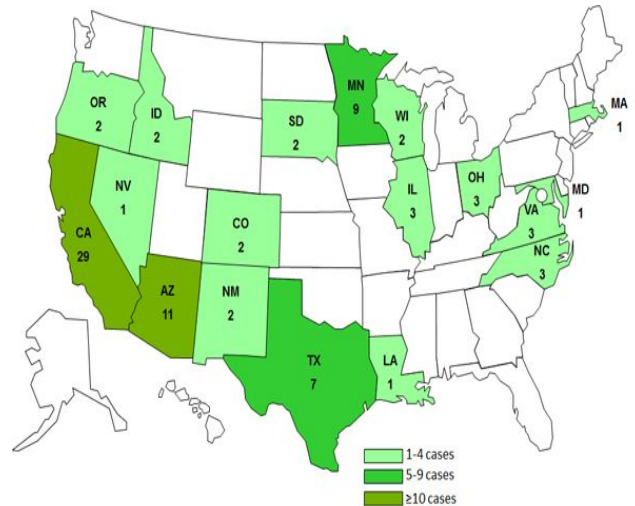
35. Which case count map best represents this case from Costco?

A

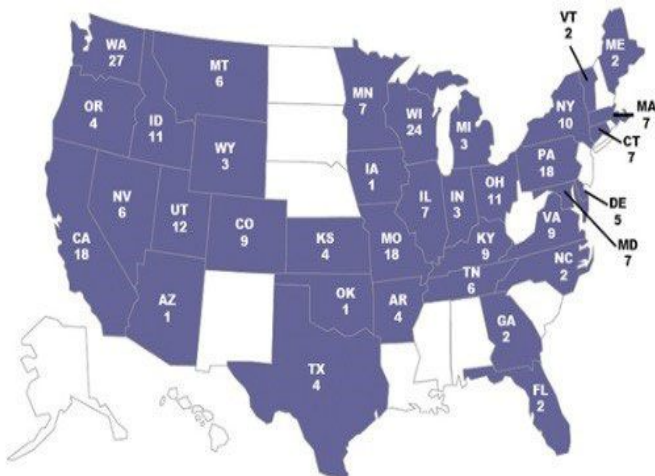
A.



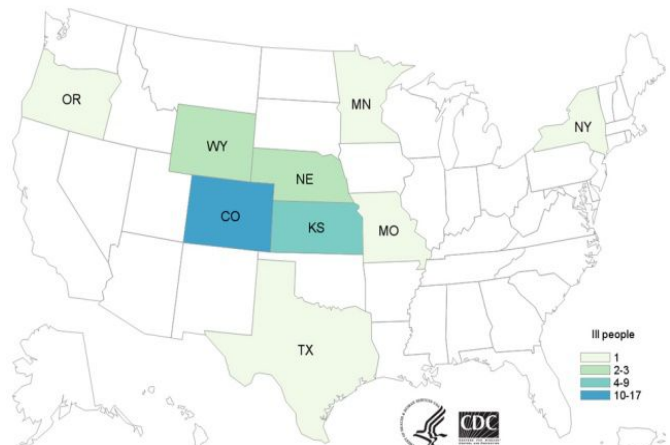
C.



B.



D.



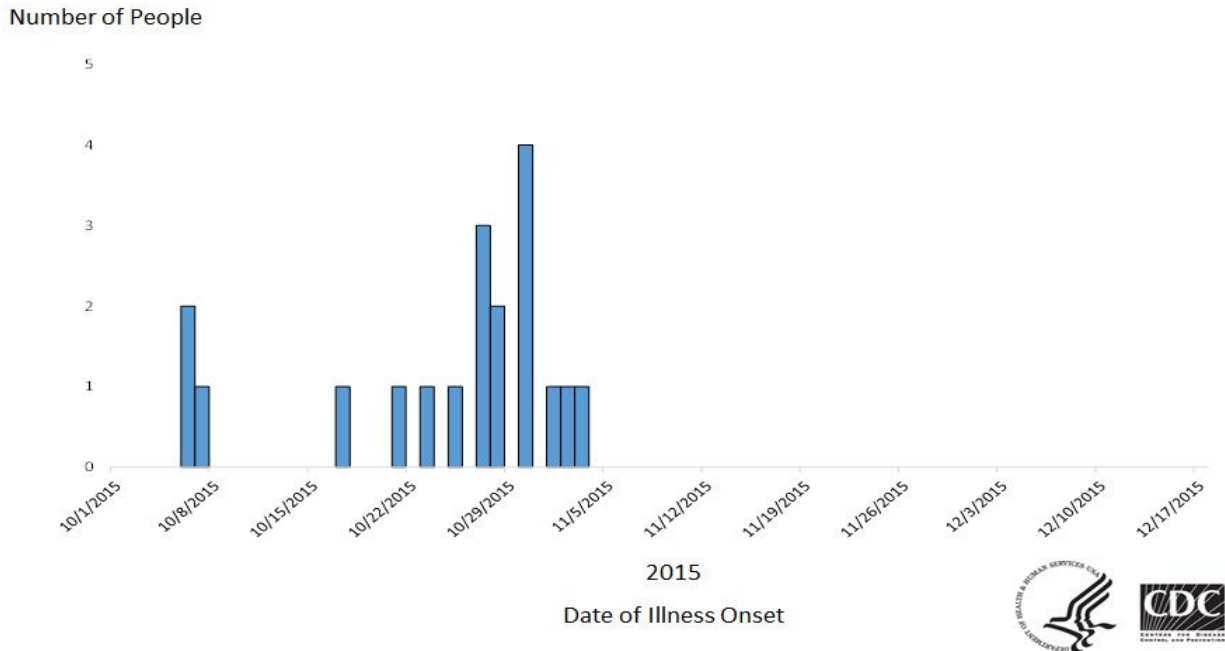
36. When did the outbreak start? October 6, 2015 to November 3, 2015

37. What was the peak case amount of the outbreak? 19

38. Which food item from Costco was linked to the cause of outbreak? rotisserie chicken salad from Costco

39. What steps are taken to avoid further outbreak? Voluntary recalls and mass media publications

Use the Graph below to answer the questions 40-44



*n=19 for whom information was reported as of December 17, 2015.

40. What type of graph is this? Epidemic curve
41. What is the x-axis variable? Date of Illness Onset
42. What is the y-axis variable? Number of cases
43. From the graph, in which month did the last case occur? November

State true or false

44. The above graph shows continuous source outbreak. False

List Three uses of Epi Curve

45. Pattern of the spread of disease
46. Measure magnitude of outbreak
47. Time trend of an outbreak or period of exposure

For questions 48 through 55 answer True(T) or False(F).

48. To avoid the risk of foodborne illness, chicken and ground beef cooked to a higher temperature than fish or roasts. True
49. Bacteria cannot grow in frozen food. True

50. Information collected by each investigator on an outbreak investigation team is only useful to that investigator. **False**

51. Food borne diseases can be caused by harmful toxins or chemicals that have contaminated the food. **True**

52. Most food related illnesses can be associated with a variety of causative agents. **True**

53. Some foodborne pathogens can also be spread by water, from person-to-person, and from animal-to-person. **True**

54. People with **vibriosis** become infected by consuming raw or undercooked seafood or exposing a wound to seawater. **True**

55. The most common sign and symptom of a food borne disease is cough and weight gain. **False**

56. Tasting food to check if it is good can prevent from food poisoning. **False**

The below table has information from 3 different persons who were reported to investigators. Based only on the information in the table, indicate which would be a confirmed case (CC), which would be a probable case (PC) and which would not be considered a case (NC).

Case Description	Case category
57. A 25 year-old women who reported having severe diarrhea along with nausea and vomiting that started on November 23. No stool culture was done. She reported participating in a banquet.	PC
58. A 46 year-old factory worker who reported having a fever, cramping and nausea that started on October 9. He had a stool culture negative for Salmonella and reported eating at a restaurant.	PC
59. A 30 year-old contractor who participated in a wedding reception and reported gastrointestinal illness including diarrhea and vomiting and had a stool culture positive for Shigella.	CC

List the steps epidemiologists have to follow after they have established the existence of an outbreak investigation

60. Verify the diagnosis

61. Construct case definition

62. Find cases systematically and develop line listing

- 63. Perform descriptive epidemiology/develop hypotheses
- 64. Evaluate hypotheses/perform additional studies as necessary
- 65. Implement control measures
- 66. Communicate findings
- 67. Maintain surveillance

In the table below write the modes of transmission and an example of the mode.

Mode of Transmission	Example of the mode
68.Direct contact	Kissing, skin to skin contact, blood transfusion
69.Droplet spread	Coughing, sneezing
70.Airborne	Suspended air particles
71.Vehicle borne	Contaminated food, clothing, Surfaces
72.Vector borne	Fleas, ticks,mosquitoes

Write the correct term for the following definition.

- 73. An instance of a particular disease. **Case**
- 74.The direct transmission of an infectious agent by means of the aerosols produced in sneezing, coughing, or talking. **Droplet Spread**
- 75.The study of the distribution and determinants of health conditions or events in populations, and the application of this study to control health problems. **Epidemiology**
- 76.The probability that an individual will be affected by, or die from, an illness or injury within a stated time or age span. **Risk**
- 77. The occurrence of cases of disease in excess of what would normally be expected in a defined community, geographical area or season. **Outbreak**
- 78. The systematic, ongoing collection, analysis, interpretation, and dissemination of health data. **surveillance.**
- 79. An aggregation of cases of a disease or other health condition that are closely grouped in time and place. **Cluster**
- 80. A group whose members have had contact with a cause of, or possess a characteristic that is a determinant of, a particular health problem. **Exposed group**

